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EXAMINER	
HOANG, TU BA	

ART UNIT	PAPER NUMBER
3742	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	**Application No.** 10/682,611	**Applicant(s)** CHRISTOFIS ET AL.	
	Examiner Tu Ba Hoang	**Art Unit** 3742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☒ Claim(s) *26 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *10/09/03*.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: copper tube "116" (as described on page 11, line 7 of paragraph [0033]). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-5 and 10-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 3, there is insufficient antecedent basis for "the austenite transition temperature" recited at lines 1-2 in the claim or from the preceding claim. Such "austenite temperature" must be clearly defined (also note in claim 14).

In claim 5, there is insufficient antecedent basis for "the martensite transformation temperature" recited at line 2 in the claim or from the preceding claim. Such "martensite transformation temperature" must be clearly defined (also note in claim 17).

In claim 10, there is insufficient antecedent basis for "the differential housing" recited at line 4 from the preceding claim 1.

In claim 12, there is insufficient antecedent for "the article" recited at lines 8, 9, 11, and 14 (i.e., all occurrences) in the claim.

In claim 18, the phrase "extending through each of the upper hub portion and..." recited at line 4 renders the claim indefinite because the phrase was appeared to be incomplete. There are some missing texts after "each of the upper hub portion". It is suggested that the phrase ", the lower hub portion and the bell-shaped portion," to be inserted thereafter. Furthermore, after "hub" recited at line 8, the term "portion" is also suggested.

In claims 19-24, the term "article" recited in the preamble (at line 1) should be changed to "housing" because the preceding claim 18 was directed to "A housing" instead and since there is insufficient antecedent basis for such "the article" in the claim or from the preceding claim 18.

Additionally, in claim 24, there are insufficient antecedent bases for "the outer surface" and "the inner surface" recited at line 2 in the claim or from the preceding claim since the "heat treatment portion" has not yet been clearly structurally defined.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 12 as being best understood is rejected under 35 U.S.C. 102(b) as being anticipated by Enk (US 3,846,609). Enk shows all features of the claimed invention including a system for induction heat treatment of a heat treatment portion 10 (i.e., outer cylindrical surface) of a differential housing B (i.e., automotive axle or other various elongated flanged workpieces, column 1, lines 6-12) which comprises an induction coil C comprising a hollow metal channel having first and second termination portions 60,62 and a semi-rectangular inductor portion 40,42,50,52 operably connected to the termination portions as shown in Figure 1, the axle B is placed within the inductor portion whereby a plurality of magnetic fields are applied to the heat treatment portion 10 thereof (column 3, lines 45-49), the axle B is rotated within the induction coil C at a selected speed (column 2, lines 62-64), the induction coil C is energized to apply magnetic fields (or flux) and to produce induction currents (eddy current) within (i.e., induce) the heat treatment portion 10 for a time sufficient to induce heating of the portion 10 to a heat treatment temperature to at least a selected case depth (i.e., quench hardening temperature, column 2, lines 66-68) and the portion 10 is cooled to a temperature to the selected case depth (i.e., subsequent quench hardening).

Claims 18-24 as being understood are rejected under 35 U.S.C. 102(b) as being anticipated by Dissett (US 4,751,853). Dissett shows a differential housing 2 comprising a metal wall having an upper hub portion 2b and a lower hub portion 2e, a bell-shaped portion 2a located between the upper and lower hub portions, a plurality of windows or cavities 8,10 extending from the outer surface to the inner surface of the bell-shaped portion 2a, wherein the bell-shaped portion 2a includes a circumferential hardened case or section 26 comprising martensitic microstructure (i.e. nodular metal) that extends inwardly from the outer surface at the portion which is located between the cavities 8,10 and the upper hub portion 2a (as shown in Figure 1 or 11).

It is noted that since claims 18-24 are directed to a final product such as the housing in which its recited hardened case is formed by an induction heat treatment including such steps recited in claims 19-24 (which is a product by process limitation). The recited hardened case is not limited to the manipulation of the recited induction heat treatment, process or step but only to the structure (i.e. hardened case) implied by such induction heat treatment. The Examiner's position is that no patentable weight to be given to such induction heat treatment but only the hardened case itself since there is no impart distinctive structural characteristics to the recited harden case (i.e., final product).

Claim 25 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Lewis (US 3,848,107). Lewis shows an induction coil 10 comprising a hollow metal channel having a first and second termination portions 12,14 and a semi-rectangular inductor portion 18,20,22,24,26 that is operable connected to the termination portions.

Claim 25 is further rejected under 35 U.S.C. 102(b) as being clearly anticipated by Vickers (US 3,649,797). Vicker shows an induction coil C comprising a hollow metal channel having a first and second termination portions 40,42 and a semi-rectangular inductor portion 30,36 that is operable connected to the termination portions 40,42.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enk (US 3,846,609) in view of Dissett (US 4,751,853). Enk shows all features of the claimed invention as set forth above including a system for induction heat treatment of a heat treatment portion 10 (i.e., outer cylindrical surface) of an article or differential housing B (i.e., automotive axle or other various elongated flanged workpieces, column 1, lines 6-12) which comprises an induction coil C comprising a hollow metal channel having first and second termination portions 60,62 and a semi-rectangular inductor portion 40,42,50,52 operably connected to the termination portions as shown in Figure 1, the axle B is placed within the inductor portion whereby a plurality of magnetic fields are applied to the heat treatment portion 10 thereof (column 3, lines 45-49), the axle B is rotated within the induction coil C at a selected speed (column 2, lines 62-64), the induction coil C is energized to apply magnetic fields (or flux) and to produce induction currents (eddy current) within (i.e., induce) the heat treatment portion 10 for a time sufficient to induce heating of the portion 10 to a heat treatment temperature to at least a selected case depth (i.e., quench hardening temperature, column 2, lines 66-68) and the portion 10 is cooled to a temperature to the selected case depth (i.e., subsequent quench hardening). Enk fails to disclose the article comprising a metal wall having hub portions and bell-shaped portion located between the hub portions with windows extending from the outer surface to the inner surface of the bell-shaped portion (i.e., a automotive differential housing) and the article also comprises nodular cast iron. Dissett shows a differential housing 2 comprising a metal wall having an upper hub portion 2b and a lower hub portion 2e, a bell-shaped portion 2a located between the upper and lower hub portions, a plurality of windows or cavities 8,10 extending from the outer surface to the inner surface of the bell-shaped portion 2a, wherein the bell-shaped portion 2a includes a circumferential hardened case or section 26 comprising martensitic microstructure (i.e. nodular metal) that extends inwardly from the outer surface at the portion which is located between the cavities 8,10 and the upper hub portion 2a (as shown in Figure 1 or 11). It would have been obvious to utilize in Enk, in place of his axle B, the article or differential housing taught by Dissett in order to allow uniform induction heating for subsequent quench hardening of outer surfaces such as those in cylindrical portion of various elongated flanged workpieces in automobile.

Claims 13-17 as being best understood are rejected under 35 U.S.C. 103(a) as being unpatentable over Enk (US 3,846,609) in view of Dissett (US 4,751,853). Enk discloses all of the claimed features as set forth above except for the differential housing comprises nodular cast iron. The use of nodular (or ductile) cast iron for differential shaft or axle or housing in automobile is old and well known, as evidence, Dissett shows the use of such nodular iron (column 2, line 67). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize in Enk 's differential housing or axle the nodular iron taught by Dissett in order to improve machinability and reduce heat treatment distortion as well as to improve the strength and to reduce wear from internal rotating components while the housing can be hardened by suitable heat treatment (column 2, line 66 to column 3, line 3).

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Goodridge (US 2,308,240), Seulen et al (US 3,483,346), Reinke et al (US 4,100,387), Pusateri et al (US 4,251,707), and Mucha et al (US 4,728,761).

Claims 26-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 10-11 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not show or suggest the induction coil having a semi-rectangular inductor portion which comprises a semi-rectangular lower and upper coil portions with the upper coil portion is located above and is proportionately smaller than the lower coil portion in the manner recited in claim 10 and 26.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu Ba Hoang whose telephone number is (571) 272-4780. The examiner can normally be reached on Mon-fri from 8:30AM to 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on (571) 272-4777. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tu Ba Hoang
Primary Examiner
Art Unit 3742

December 08, 2004